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Bulletin No. 60 - Poultry Experiments

James Dryden

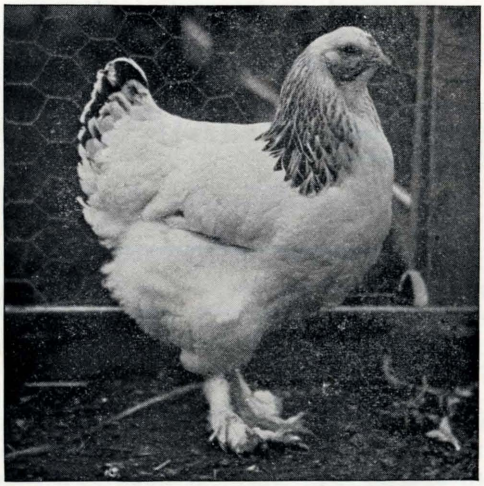
EXPERIMENT STATION

OF

THE AGRICULTURAL COLLEGE

OF UTAH.

Bulletin No. 60.



POULTRY EXPERIMENTS.

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POULTRY EXPERIMENTS.

BULLETIN NO. 60.

JAMES DRYDEN.

The experiments in egg production outlined in Bulletin No. 51 of this Station, were, in the main, continued during the year ending November 7, 1898. The results of this second year's work are reported herein. These experiments were designed to show:

1. The relative value of year-old hens and of pullets.
2. The effect of exercise.
3. The relative value of early and of late hatched pullets.
4. The yearly food cost per fowl.
5. The average yearly production of eggs per hen.
6. The weight of eggs from different breeds.
7. The relative fertility of eggs under different treatments.
8. The relative fertility of fresh and of old eggs.
9. The merits of different incubators.
10. The effect of different methods in artificial incubation.

OUTLINE.

The following outline shows the arrangement of the pens:

PEN. WITHOUT EXERCISE.

2. Early hatched pullets.
3. Early hatched year-old hens.

PEN. WITH EXERCISE.

1. Early hatched pullets.
4. Early hatched year-old hens.
5. Late hatched pullets.

ROSE COMB BROWN LEGHORNS.

6. Black Leghorn pullets.
7. Late hatched Barred Plymouth Rock pullets.
8. Light Brahma year-old hens.
9. Light Brahma pullets.
10. Barred Plymouth Rock pullets.

CONDITIONS OF THE EXPERIMENTS.

During the year each pen contained five fowls, except in two cases—pen 6 of Black Leghorns and pen 8 of Brahmas, the former having three and the latter four fowls. During the previous year there were four fowls in each pen. An extra fowl was put in each of pens 3 and 4 at the beginning of second year; the one for pen 3 being taken from pen 2 (late-hatched pullets) of 1896–7, without exercise, and the extra fowl for pen 4, was taken from pen 6 (late-hatched pullets), with exercise, of 1896–7. Pens 3, 4 and 8 were continued from the first year, in order to contrast their egg records during their first and second years. The fowls of these three pens were pullets when the experiments of 1896–7 began. They were hatched in the spring of the year 1896, and were therefore at the beginning of the second year's experiments—November 7, 1897,—about one and a half years of age. At the end of the second year's experiments they had completed two seasons' laying, being then about two and a half years of age.

Pens 1 and 2 were early hatched pullets, from the same stock as pens 3 and 4. These were hatched about the same time of the year as those of pens 3 and 4. They began laying

about the first of October, and had laid up to the date of the commencement of the experiments, forty eggs. These eggs are not counted in their egg record given herein. These two pens were fed practically the same ration and received about the same care as pens 3 and 4 during the first year. That is, pen 1 was fed as pen 4 had been fed, and pen 2 as pen 3.

Pen 5 was made up of late-hatched pullets, the date of the hatch being June 10. They were of a different strain of Leghorns from pens 1, 2, 3 and 4. They were from eggs furnished the Station by H. E. Benedict of Elmira, N. Y.

Pen 6, Black Leghorn pullets, hatched May 10. Placed in experiment May 30.

Pen 7 were late-hatched pullets, and were put into the experiment March 8.

Pen 8 contained the same fowls as in the previous year.

Pen 9 contained five Light Brahma pullets, which were purchased in Iowa. Their ages could not be learned; though as their weights will show, they had not matured when put into the experiment.

Pen 10 were Barred Plymouth Rock pullets, about fully matured when put in the experiment on January 10.

The Station had made arrangements to have a thoroughly representative pen of Barred Rock pullets placed in the experiment so that a fairly accurate test might be made of this breed for egg production; but through an unaccountable failure of the party, with whom we had negotiated for a suitable pen, in carrying out his contract, we were left without any Barred Rocks until after the experiment had begun, and it was then impossible to get an even lot of pullets suitable for such an experiment. Our breed test, therefore, during the past year, as during the first year, has little to commend it.

By way of further apology, and in justice to "the hen," two other unfavorable conditions should be mentioned. First, there was a change of feeders shortly after the experiments had been started, and a month or two later still another change was made. Second, from some cause, some of the pens—notably pens 1, 2, 3 and 4—during early winter contracted colds, which resulted in badly swelled heads in several cases. Could these two unfavorable conditions be eliminated, the record of these pens, though good, would certainly have been better.

THE PENS.

The pens are 5x7 feet, and are divided by wire partitions. Counting the time the males were in the pens, there were on an average five and one-third fowls in pens 1, 2, 3, 4, 7, 9 and 10. The floor space was therefore equal to about six square feet per fowl. In the case of pens 5 and 6 the male was in the pen throughout the year; so that in pen 5 there were 35 square feet for six fowls, and in pen 6, 35 square feet for four fowls.

THE EXERCISE.

The exercise, as during the first year, consisted in making the fowls scratch for their grain food, which was fed in a litter of straw about six inches deep. This straw was renewed once a week in winter and twice a month in summer. The pens without exercise were fed in boxes. There was no floor in the pens, and of course the hens fed in the boxes had considerable exercise by scratching in the ground, and in the outside runs they had more or less exercise in summer.

METHOD OF FEEDING.

All pens were fed alike, except as to quantity. Subsequent tables will show what each pen was fed. A warm mash was fed every morning. This was composed of bran, two parts; ground oats, one part; and ground corn, one part. This was seasoned with salt and a little cayenne pepper. About 10 o'clock a little grain was fed, wheat one day and oats the next. Then in the evening, or late afternoon, wheat was fed, all they would eat up clean. Three times a week cut bones, or butchers scraps, were fed. During the winter the green food consisted of lucern (alfalfa) leaves thrown in the pens, and in summer green lucern and clover were fed. In the early spring a section of the yards was covered with a good growth of rye which furnished all the green food necessary for several weeks. After that was eaten down, green lucern and clover were cut and thrown into the pens. Coal ashes were kept in a box in each pen, most of the year, as were also ground oyster shells.

SHADE.

The shade for the fowls in midsummer was furnished by a growth of Russian sunflowers in a section of each pen. There

was no other shade available. The building facing the south and sloping to the south, affords no protection against the heat of the sun. The temperature inside of the building was very high during the warm months. Throughout the summer the fowls suffered from the heat of the building when they were in feeding, as they must necessarily be a large portion of the day. Trees have now been planted in the yards, which will in time protect the building from the sun.

WEIGHTS OF FOWLS.

Each fowl was weighed every two weeks during the year. Table No. 1 gives the weights of each pen on the dates mentioned, and at the bottom of the column the average weight of the pen and the average weight per fowl are given. In Bulletin No. 51, the weights of pens 3, 4 and 8, as pullets, are given. Pen 3 averaged as pullets 3.32 pounds per fowl; pen 4, 3.42 pounds, and pen 8, 6.7 pounds per fowl. By referring to table No. 1, it is seen that pen 3 averaged .22 pounds more during the second year than during the first; pen 4, .24 pounds more during the second year, and pen 8, .65 pounds more during the second year than during the first. The pullets of pens 1 and 2 of 1897-8, averaged slightly heavier than pens 3 and 4 as pullets. Pen 5, late-hatched Leghorns, averaged about ¾ pound less than pens 1 and 2, early hatched. Pen 5 was of a different strain, as already noted, from pens 1, 2, 3, and 4, which latter pens were all from the same stock. The Black Leghorns weighed somewhat less than the Browns. Pens 7 and 10 were of the same breed but from different breeders. There is a remarkable difference in their weights. The pullets of pen 7 were underweight, and those of pen 10 overweight, the standard weight of a Plymouth Rock pullet being 6½ pounds. Of the Brahmas, the hens of pen 8, as well as the pullets of pen 9, were less than standard weights, the standard calling for 9½ pounds for the hen and 8 pounds for the pullet. Pen 8, as pullets, weighed 6.7 pounds.

TABLE No. I.—WEIGHTS OF PENS AND AVERAGES OF FOWLS.

DATE.	Pen No. 1.	Pen No. 2	Pen No. 3	Pen. No. 4	Pen No. 5.	Pen No. 6.	Pen No 7.	Pen No. 8.	Pen No. 9.	Pen No 10
Nov. 8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" 22	18.5	17.4	16.8	17.5	12.0	.....	.....	26.0	30.5	.....
Dec. 6	19.4	18.5	17.7	19.0	12.8	10.1	.....	27.7	32.5	.....
" 20	19.4	18.8	18.3	19.7	13.4	9.1	.....	29.4	33.7	.....
Jan. 3	18.8	17.7	18.6	20.2	14.6	9.7	.....	30.0	34.3	.....
" 17	19.1	18.5	18.9	20.9	15.4	10.2	.....	31.6	36.6	40.6
" 31	18.5	18.7	18.4	21.2	14.5	10.6	.....	31.1	37.1	40.6
Feb. 14	18.8	18.0	17.8	21.6	14.7	10.2	.....	31.9	37.8	39.8
" 28	17.8	17.6	16.7	20.5	15.4	10.4	.....	31.4	37.3	38.4
Mar. 17	17.4	17.7	17.6	26.3	13.4	10.6	24.1	31.4	36.7	37.2
" 31	18.1	18.1	17.6	19.5	13.7	11.2	24.3	26.6	36.3	38 2
Apr. 4	17.6	18.0	17.9	18.6	14.5	11.0	25.0	31.4	37.5	38.4
" 18	18.2	16.5	19.0	18.0	13.9	10.7	26.1	30.3	36.6	38.5
May 2	18.2	17.4	18.1	18.1	13.9	10.4	26.0	29.8	35.7	38.7
" 16	17.0	15.7	17.4	16.7	14.1	10.3	23.9	28.3	34.4	38.0
" 30	17.6	17.3	17.7	18.0	14.3	10.1	25.3	28.0	35.0	39 1
Jun. 13	17.4	16.3	17.3	17.8	13.9	10.2	25.1	29.2	34.4	40.0
" 27	17.8	17.1	17.1	18.7	13.7	11.0	25.5	29.4	34.4	40.6
Jul. 11	16.4	16.5	18.3	19.7	13.3	10.2	25.9	29 2	35.0	40.3
" 25	15.5	15.1	16.0	18.7	14.0	10.1	25 4	29.3	33.5	40.4
Aug. 8	17.1	16.4	16.4	18.3	13.7	10.4	26 1	30.1	35.0	40.8
" 22	17.4	16.6	17.1	19.3	14.2	10.3	26.3	30.0	34.9	41.6
Sep. 5	17 2	16.7	16.9	20.0	14.2	10.5	25.6	29.7	35.0	42 1
" 19	18.3	17.7	17.7	20.3	14.4	10.6	26.6	28.8	36.1	42.6
Oct. 3	18.1	17.7	18.1	19.6	15.0	11.7	27.9	27.9	37.0	43.0
" 17	17.9	18.3	18.7	19.2	14.8	13.0	28.7	27.4	35.8	34.6
Average	17.9	17 4	17.7	19.3	14.1	10.1	25.7	29.4	35.3	39.7
Average per fowl	3.58	3.48	3.54	3.86	2.82	3.33	5.14	7.35	7.06	7.94

CONSUMPTION AND COST OF FOOD.

Table 2 gives the food consumption per fowl for each of the pens. With three exceptions, it shows the food consumed during the year; the exceptions being pens 6, 7 and 10. Pen 6 was placed in the experiment on November 30, or three weeks after the beginning of the experiments. Pen 7 was put in on March 8, so that the record for this pen is for three-fifths

of the year only. Their food consumption for the year, therefore, would be about one-fourth greater than is shown in the table. Pen 10 was put in the experiment on January 10th, or two months after beginning of the experiments; so that the food consumed by this pen and shown in the table was for only five-sixths of the year.

TABLE No. II.—WEIGHTS IN POUNDS PER FOWL.

PEN.	Mash.	Wheat	Oats.	Bones.	orn.	Oyster Shell.	Total Food.	Dry Matter.	Cost of Food.
									Cts.
1.....	9.1	35.7	21.9	9.8	0.5	1	78.0	65.5	67.0
2.....	9.1	34.0	20.5	9.7	0.5	1	74.8	61.9	64.4
3.....	9.1	33.5	18.2	9.6	0.5	1	71.9	59.4	62.1
4	9.1	34.5	22.0	9.8	0.5	1	76.9	63.9	66.5
.....	8.2	32.5	20.2	8.8	0.4	1	70.2	59.3	60.5
6	10.0	41.7	23.0	10.4	....	1	85.1	71.60	74.6
7.....	10.9	30.4	14.5	9.0	...	1	65.8	53.25	56.7
8.....	17.9	47.4	27.3	14.2	0.9	1.2	108.9	88.21	90.2
9..	16.8	43.0	26.1	12.2	0.7	1.2	100.0	80.97	82.9
10.....	13.7	37.5	21.6	10.8	.. .	1.2	84 8	68.85	72.5

In comparing pens 3 and 4 as pullets and as year-olds, (Table 7), it will be seen that pen 3 consumed about 5 pounds more total food as year-old hens than as pullets. Pen 4 consumed about 8 pounds more during the second year than during the first. The increase was mostly in wheat and oats, there being a decrease in the amount of mash, bones, and corn.

Pen 5, late-hatched pullets, consumed less food than any other pen. As will be seen, the cost of food ranged from 60.5 cents per fowl to 67 cents for the five pens of Leghorns, the average of the five being 64.1 cents. This slightly increased cost is largely due to the cost of the oyster shell fed. During the first year there was nothing charged for oyster shell, as there was practically none fed.

The cost of the different foods was as follows: Mash, $\frac{5}{14}$ cents per pound; wheat, 1 cent; oats, $\frac{3}{4}$ cent; bones, $\frac{3}{4}$ cent; corn, 1 cent; oyster shell, 3 cents.

It will be noticed that wheat constituted the principal item f the rations. The food was all weighed each day, except the

wheat and oats, which were weighed out weekly into feed boxes in each pen. Corn was fed for the first two weeks of the experiment and discontinued.

SUMMARY OF RESULTS.

A summary of the financial results is given in table No. 3. This shows the food cost per fowl, the number of eggs laid per fowl, the value of those eggs at market prices, the food cost per dozen of eggs, and the per cent profit on food.

TABLE No. III —SUMMARY.

		Cost of food.	Avr'g No. of Eggs laid.	Value.	Food cost per dozen.	Per ct. profit on Food.
		Cents.			Cents	
Exercise— 1. Pullets	R. C. Brown Leghorns.	67.	160.2	$1.91	5.	182
No Exercise— 2. Pullets		64.4	157	1.81	4.9	185
No Exercise— 3. Year-old hens		62.1	150.8	1.68	4.9	170
Exercise— 4. Year-old hens		66.5	114.2	1.11	7.0	67
5. Late hatched pullets		60.5	164.6	1.78	4.4	194
6. Black Leghorn Pullets		74.6	130	1.33	6.9	77
Late hatched— 7. Barred Plymouth Rock pullets		56.7*	105	1.11	6.5	97
Year-old— 8. Light Brahmas		90.2	97	.96	11.1	8
9. Light Brahma Pullets		82.9	129	1.33	7.7	37
10. Barred Plymouth Rock pullets		72.2†	127	1.28	6.9	77

* For eight months. † For ten months.

Pen 5, it is seen, consumed the smallest amount of food, laid the largest number of eggs, produced eggs at the lowest cost per dozen, and shows the highest per cent profit on food. Pen 1 exceeds any other pen in the value of eggs laid. It also shows more profit per fowl, but in the per cent profit on food it falls slightly behind pens 2 and 5. Pen 1 gives a profit of $1.24 over and above cost of food; pen 2 gives a profit of $1.16½, and pen 5, $1.17½. But the food consumption was so much less for the latter two pens that the final result is against pen 1. Pen 8 produced eggs at greater cost than any other pen. This was the second year of this pen. As pullets they produced 147¾ eggs each, at a food cost of 81¼ cents. Pen 7 consumed 56.7 cents worth of food per fowl during the eight months it was in

the trial. The food cost would have been about a third more for this pen had it been in the experiment the full period, and the per cent profit would have been so much less. As explained elsewhere the records made by pens 8, 9 and 10, and, indeed, by all of the pens, are not what might be considered high averages. The treatment and feeding of the hens and the conditions of the experiments were not all that could be desired. No fair comparison can be made between pen 5 and pens 1, 2, 3, and 4, for the reason, already explained, that pen 5 was from a different strain and reared under different conditions. Pen 5 shows an excellent record, however, nearly equal to the best record made during the previous year, so far as financial results are concerned. When it is considered that they laid no eggs until January, when the price of eggs had fallen, the record is very satisfactory.

MONTHLY EGG RECORD.

Table No. 4 gives the number of eggs laid by each pen during each month, and the total for the year. Table No. 5 gives the value in cents of the eggs laid each month, and the total value for the year. The market prices for the eggs are given for each month at the bottom of the table, and it is on these prices that the monthly value of the eggs laid is computed.

TABLE No. IV.—EGG RECORD.

PEN.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Total.
1.....	33	71	52	49	47	85	102	99	54	85	70	54	801
2.....	25	66	53	65	70	96	91	98	62	62	59	38	785
3.....	....	36	35	35	52	83	94	94	85	85	94	61	754
4.....	....	..	....	10	70	92	80	82	77	88	58	14	571
5	....	....	62	48	52	96	107	101	83	86	99	89	823
6.....	5	12	24	10	51	66	52	54	47	44	24	1	390
7.....	....	....	....	....	9	59	74	83	95	83	48	73	524
8.....	....	1	12	....	3	76	78	64	57	61	25	11	388
9.....	....	....	9	4	8	98	111	110	102	102	81	20	645
10.....	....	....	13	42	16	91	115	91	96	72	70	29	635

The falling off in laying of pens 1 and 2 in January and February was caused by the severe colds from which some of the

fowls suffered during these months, and partly from other causes already mentioned. Pens 3 and 4 also suffered from the same cause or causes; so, doubtless, was the laying of the other pens injuriously affected. The best single month's record was made in July by pen 10, which laid 115 eggs, or an average of twenty-three per fowl. Pen 9 came second with 111 eggs during the same month. Pen 9 made an excellent record during the four months of May, June, July and August, averaging per fowl over twenty-one eggs per month. Pen 5 laid their first egg on January 1st. The best monthly record, when the money value of the eggs produced is considered, was by pen 1 in December, when they produced eggs worth $1.48. The next best record was made by pen 9 in August, when they produced eggs worth $1.41. It will be noticed that pens 5 and 7, late hatched pullets, made the best records in October, when the price of eggs was the same as in the month of January.

TABLE No. V.—VALUE OF EGGS IN CENTS.

PEN.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.		Oct.	Total.
1.....	55	148	78	51	40	71	85	82	54	106	88	97	$9.55
2.....	42	138	79	78	57	80	77	82	62	79	74	57	9.05
3.....	....	75	52	36	43	77	78	78	85	106	117	91	8.38
4	....	....	....	10	57	76	66	67	77	110	72	21	5.56
5.....	....	....	93	50	43	80	89	84	83	107	124	134	8.87
6.....	8	25	36	10	44	55	43	45	47	55	30	2	4.00*
7.....	....	....	....	....	7	49	62	69	95	104	60	109	5.55
8.....	....	2	18	....	3	63	65	53	57	76	31	17	3.85†
9.....	....	....	14	4	7	82	92	92	102	141	100	30	6.64
10.....	....	....	20	44	13	76	96	76	96	89	88	44	6.42
Price of Eggs per Dozen...	20	25	18	12½	10	10	10	10	12	15	15	18	

*Three hens †Four hens.

Pens 1, 3, 5 and 7 did not stop laying until November. The following are the number of eggs laid by each of those pens in November, till the close of experiment: Pen 1, eight eggs; pen 3, one; pen 5, fifteen; pen 7, ten. These eggs are added to the number laid in October.

PULLETS VERSUS YEAR-OLDS.

Pen 4 of Brown Leghorn pullets in 1896-7 made a record of 181¾ eggs per fowl, worth $1.88, at a food cost of 62 cents. During their second year, under nearly similar conditions as to feeding and management, they laid 114.2 eggs, worth $1.11, at a food cost of 66½ cents. Pen 3, Brown Leghorn pullets, in 1896-7 made a record of 157¾ eggs, worth $1.68, at a food cost of 61¼ cents. During their second year they laid 150.8 eggs worth $1.68, at a food cost of 62.1 cents. During the first year pen 4 produced eggs at a cost of 4.1 cents per dozen; pen 3 at 4.6 cents per dozen. During the second year the cost was 7 cents and 4.9 cents respectively. The data in full are condensed in table No. 6. During the first year the two pens of 3 and 4 year-old hens produced eggs at 9.9 cents (without exercise) and 6.9 cents a dozen (with exercise). These two pens were discontinued during the second year. Taking the average of the two, pens 3 and 4, their returns as pullets were 40 per cent better than as year-olds, figuring on the food cost per dozen of eggs.

TABLE No. VI.

Pen.	Cost of Food.		No. of Eggs laid.		Value of Eggs.		Food cost per doz.		P'r ct. profit on food.	
	1896-7	1897-8	1896-7	1897-8	1896-7	1897-8	1896-7	1897-8	1896-7	1897-8
	Cts.	Cts.					Cts.	Cts.		
3. No Exercise	61.2	62.1	157¾	150.8	$1.68	$1.68	4.6	4.9	174	170
4. Exercise	62.	66.5	181¾	114.2	1.88	1.11	4 1	7.0	203	67
Averages	61.7	64.3	175	132.5	1.78	1.395	4.3	6.0	188	118

A TWO YEARS' COMPARISON WITH PULLETS.

Table No. 7 gives the results for two years with two pens of pullets each year. The averages per fowl are given. The "No Exercise" pullets were pen 3 of 1896–7, and pen 2 of 1897–8. The "Exercise" pullets were pen 4 of 1896–7, and pen 1 of 1897–8. As will be seen, the average profit for the two years on cost of food is $1.12 per fowl for the former, and $1.25 for the latter; in other words, a profit of 178 per cent and 194 per cent respectively.

TABLE No. VII.

	Cost of Food.		No. of Eggs Laid.		Value of Eggs.		Food Cost per doz.		P'r ct. profit on food.		Av'rg. Profit Per Fowl.
	1896-7	1897-8	1896-7	1897-8	1896-7	1897-8	1896-7	1897-8	1896-7	1897-8	
	Cts.	Cts.					Cts.	Cts.			
No Exercise.....	61.2	64.4	157¾	157	$1.68	$1.81	4.6	4.9	174	182	$1.12
Exercise.....	62.0	67.0	181¾	160.2	1.88	1.91	4.1	5.0	203	185	1.25

WEIGHT OF EGGS AND COST PER POUND.

Table No. 8 gives the average weights of the eggs from the different pens. The pen numbers are at the head of the columns. The first line shows the average weight in ounces of each egg. The second line, the weight in pounds per dozen; the third column the total average weight of eggs in pounds laid by each fowl during the year. In the last line the cost per dozen of eggs for each of the pens is given.

TABLE No. VIII.—AVERAGE WEIGHTS OF EGGS.

	Pen No.									
	1	2	3	4	5	6	7	8	9	10
Weight of each egg in ounces	2.03	2.05	2.07	1.95	1.67	2 01	1 88	2.30	2.07	2.07
Per dozen eggs, pounds....	1.52	1.54	1 55	1.46	1.25	1.51	1.41	1.73	1 55	1.55
Per Fowl for year, pounds	20.48	20.11	19.53	13.90	17.01	16 33	12 34	14 37	16.69	16.43
Cost per lb. of eggs, cents..	3 29	3.18	3 16	4.80	3.52	4.57	*4.60	6.24	4.95	†4.45

*Eight months. †Ten mon

Contrasting the weights of the eggs of pens 3 and 4 in their first and second years, there is very little difference noted. The eggs from pen 3 as pullets, weighed 1.49 pounds per dozen, as against 1.55 as year-olds. Pen 4 as pullets, laid eggs averaging 1.42 pounds per dozen, and 1.46 pounds as year-olds. Taking pen 3, 30 dozen (a caseful) of second-year eggs would be equal in weight to 31.2 dozen of the first-year eggs. In the case of pen 4 there is less difference; 30 dozen of their second-year eggs are equal to 30.8 dozen of their first-year eggs. The pullets of the second-year laid heavier eggs than the ullets of the first year. It is also noted that the pens with-

out the exercise laid eggs of greater weight than those with the exercise. This confirms the results of the previous year. Pen 5 laid a very small egg compared with the other pens of Leghorns. A case of eggs from pen 5 would weigh 37.5 pounds against 45.6 pounds from pen 1; in other words, 30 per cent lighter. This goes to prove that eggs from different strains of the same breed of fowls vary very much in weight. The heaviest eggs were laid by pen 8 of Light Brahma hens, the eggs from this pen being 6.3 pounds per case of 30 dozen heavier than those of pen 1. Pen 1 exceeded any other pen in the average total weight of eggs per fowl for the year, the weight being 20.48 pounds. In food cost per pound of eggs, pen 3 leads, followed by pens 2 and 1, the highest cost being for pen 8.

WEIGHTS OF FOOD.

Table No. 9 contains the weights of food given each pen during the year, in four-week periods, together with the total food for the same period and the number of eggs laid. The weights are in ounces. At the bottom of each column the total weight of each separate food is given. The weights are for the pen, not the average per fowl. It will be noticed that after the first two periods, or after January 3, there was a considerable reduction in the amount of mash fed. It was found that they were getting more than they would eat up readily, and that "symptoms" of laziness were making themselves manifest, and it was necessary to reduce the amount of mash in order to induce greater exercise.

This table shows the food consumption of each pen. In the following pens, 1, 2, 3, 4, 7, 9 and 10 there were five fowls for the year and a male a third of the year, or five and one-third fowls for the year; so that to get the consumption per fowl for these pens the total is divided by five and one-third. For pen 5, the male was kept in the pen throughout the year, and the table therefore represents the consumption of food for six fowls for the year. In pen 6 there were three pullets and a male through-out the year; in pen 8, four hens and a male the third of the year. For pens 6, 7 and 10, the table gives the food consumption for different fractions of the year, as will be seen.

TOTAL FOOD PER DAY.

The average weights in ounces of the different foods fed per day and the total food per day, are given at the bottom of table No. 9. By taking the average of the total food for the five pens of Brown Leghorns it will be seen that they consume 3.23 ounces per day per fowl. That would mean, on the same basis, 20 pounds total food for one hundred Leghorn hens. The two pens of Brahmas averaged 4.55 ounces per day, equal to about 28½ pounds for one hundred such hens. Pens 7 and 10 of Plymouth Rocks averaged 4.32 ounces per fowl, equal to 27 pounds per day for one hundred hens.

It must be noted, of course, that the amount of food consumed varied at different seasons. This is due largely to the fact that a hen in "full flow" of eggs consumes more food than another such hen that is not laying. It is difficult, however, to make any pointed comparisons from this table as to the effect of different quantities of food on egg production, because other conditions, some of which cannot be controlled, affect egg production.

TEMPERATURE OF BUILDING.

A record of the minimum temperature of the building was kept during January, February and March. This temperature was taken at 7 o'clock in the morning, probably the coldest part of the day. Table No. 10 gives the daily readings and the means for the month. It will be seen that the thermometer got down to 16° in January, and the average for the month was 25°. February averaged 35° and March 37°. No artificial heat was used.

TABLE No. IX.—WEIGHTS OF FOOD IN OUNCES IN FOUR-WEEK PERIODS AND NUMBER OF EGGS LAID.

Period.	Pen. No. 1.							Pen No. 2.							Pen No. 3.							Pen. No. 4.							Pen No. 5. (6 Fowls.)						
	Mash.	Oats.	Wheat.	Corn.	Bones.	Total.	Eggs.	Mash.	Oats.	Wheat.	Corn.	Bones.	Total.	Eggs.	Mash.	Oats.	Wheat.	Corn.	Bones.	Total.	Eggs.	Mash.	Oats.	Wheat.	Corn.	Bones.	Total.	Eggs.	Mash.	Oats.	Wheat.	Corn.	Bones.	Total.	Eggs.
Nov. 9 to Dec. 6....	81	150	160	40	51	482	48	81	128	143	39	47	438	34	81	130	139	41	48	439	....	81	151	166	41	51	490	...	81	139	164	34	50	468	....
Dec. 7 to Jan. 3....	84	168	222	....	69	543	65	84	140	202	..	60	486	66	84	142	204	..	60	490	42	84	168	220	..	69	541	....	84	172	231	....	71	558	2
Jan. 4 to Jan. 31....	60	170	209	....	59	498	44	60	156	210	..	59	485	44	60	145	195	..	55	455	29	60	167	201	..	58	486	....	67	185	209		61	522	60
Feb. 1 to Feb. 28...	56	127	143	....	54	380	49	56	182	153	..	57	448	65	56	136	129	..	51	372	35	56	155	136	..	56	403	10	56	183	154	..	61	454	48
Mar. 1 to Mar. 28...	56	129	164	....	72	421	43	56	167	177	..	75	475	62	56	125	157	..	75	413	44	56	109	148	..	72	385	62	56	135	154	....	72	417	47
Mar. 29 to Apr. 25..	56	145	219	....	68	488	70	56	144	223	..	68	49	89	56	140	226	..	69	491	76	56	151	199	..	69	475	85	56	136	225	....	69	486	83
Apr. 26 to May 23...	56	165	227	....	66	514	100	56	172	254	..	66	548	83	56	126	245	..	66	493	92	56	152	243	..	66	517	84	56	172	257	....	66	551	97
May 24 to Jun. 20...	56	181	304	....	62	603	80	56	172	304	..	62	594	85	56	120	304	..	62	542	82	56	185	304	..	62	607	67	56	181	304	....	62	603	95
Jun. 21 to Jul. 18...	56	136	310	....	72	574	80	56	126	285	..	72	539	88	56	119	271	..	72	518	87	56	155	311	..	72	594	68	56	155	300	....	72	583	83
Jul. 19 to Aug. 15...	56	147	270	....	66	539	48	56	108	237	..	66	467	40	56	106	251	..	66	479	62	56	153	277	..	66	552	80	56	147	266	....	66	535	76
Aug. 16 to Sept. 12..	56	145	284	....	72	557	84	56	102	255	..	72	485	54	56	113	249		72	490	87	56	150	277	..	70	553	69	56	148	279	....	66	549	84
Sept. 13 to Oct. 10..	56	119	298	...	66	539	53	56	108	261	..	66	491	57	56	111	280	..	66	513	87	56	127	289	..	66	538	45	56	131	308	....	66	561	80
Oct. 11 to Nov. 7....	48	51	235	....	64	398	37	42.5	45	197	.	60	344	19	42.5	46	213	..	60	361	31	42.5	57	207	..	60	366	1	51	57	259	....	65	432	67
Total.....	777	1833	3045	40	841	6536	801	771.5	1750	2901	39	830	6291	785	771.5	1559	2863	41	822	6056	754	771.5	1880	2978	41	837	6507	571	787	1911	3110	34	847	6719	823
Food pr day pr fowl	.40	.94	1.57	.02	.43	3.36	....	.40	.90	1 50	02	.42	3.24	...	.40	.50	1.47	02	.42	3.12	....	.40	.97	1 53	20	.43	3.35	...	.36	.89	1.92	.01	.39	3.07	....

TABLE No. IX—CONTINUED.--WEIGHTS OF FOOD IN OUNCES IN FOUR-WEEK PERIODS, AND NUMBER OF EGGS LAID.

Period.	Pen. No. 6. (4 Fowls)						Pen No. 7.						Pen No. 8. (4⅓ Fowls)							Pen No. 9.							Pen No. 10.					
	Mash.	Oats.		Bones.	Total.	Eggs.	Mash.	Oats.	Wheat.	Bones.	Total.	Eggs.	Mash.	O ts.	Wheat.	Corn.	Bones.	Total.	Eggs.	Mash.	Oats.	Wheat.	Corn.	Bones.	Total.	Eggs.	Mash.	Oats.	Wheat.	Bones.	Total.	Eggs.
Nov. 9 to Dec. 6.....	14	28	36	12	90	7	....	....	....	....	....	....	81	160	180	53	43	517	....	110	204	237	55	63	669	....	....	....	....	....	....	....
Dec. 7 to Jan. 3.....	63	120	180	49	412	12	....	....	...	....	....	....	98	182	250		77	607	....	119	203	291	....	81	694	....	....	....	....	....	....	....
Jan. 4 to Jan. 31....	56	139	180	48	423	22	...	....	....	....	....	....	96	180	228	....	62	566	9	128	211	280	....	75	694	9	81	168	230	55	534	13
Feb. 1 to Feb. 28....	56	133	115	46	350	10	....	....	....	....	....	..	92	159	148	....	59	458	....	107	188	169	.. .	67	531	4	112	200	182	72	566	42
Mar. 1 to Mar. 28...	63	109	123	72	367	45	73	104	138	72	387	9	84	102	119	....	84	389	1	105	104	146	....	93	448	6	112	120	167	96	495	12
Mar. 29 to Apr. 25...	56	125	220	69	470	60	112	141	230	93	576	44	84	119	179	....	82	464	63	112	144	250	....	93	599	81	112	151	249	93	605	76
Apr. 26 to May 23...	56	157	253	66	532	53	112	174	272	88	646	74	84	156	260	...	77	577	75	112	180	281	....	88	661	107	112	184	289	88	673	104
May 24 to Jun. 20...	56	164	300	62	582	47	112	188	336	84	720	77	101	162	295	....	82	640	57	112	192	352	....	84	740	97	112	192	352	84	740	86
Jun. 21 to Jul. 18...	55	128	288	63	534	39	112	161	350	96	719	84	112	162	338	....	96	708	64	112	192	370	....	96	770	88	112	192	370	96	770	93
Jul. 19 to Aug. 15..	42	103	233	49	427	49	112	139	342	82	675	65	112	154	339	....	82	687	53	112	192	313	....	82	699	100	112	192	334	82	720	70
Aug. 16 to Sept. 12..	36.5	106	240	38	420	35	112	145	316	88	661	74	112	143	308	...	88	651	40	112	187	330	....	88	717	93	112	190	344	88	734	72
Sept. 13 to Oct. 10...	42	107	252	36¼	437	11	112	131	290	88	621	39	112	148	323	....	88	671	16	112	153	357	...	88	710	57	112	159	366	88	725	52
Oct. 11 to Nov. 7....	46.5	54	249	56	405	....	86	57	320	76	539	58	75.5	61	321	....	69	526	6	86	81	295	.	76	538	3	86	93	322	76	577	15
Total	642	1473	2669	666¼	5449	390	943	1240	2594	767	5544	524	1243	1888	3288	53	989	7461	388	1439	2231	3671	55	1074	8470	645	1175	1841	3205	918	7139	635
Food pr day pr fowl	.47	1.08	1.98	.49	3.99	....	.72	.95	1.98	.59	4.24	....	79	1.20	2.08	.03	.63	4.73	....	.74	1.14	1.91	.03	.35	4.37	....	.73	1.14	1.98	.57	4.41	....

FIG. 1.

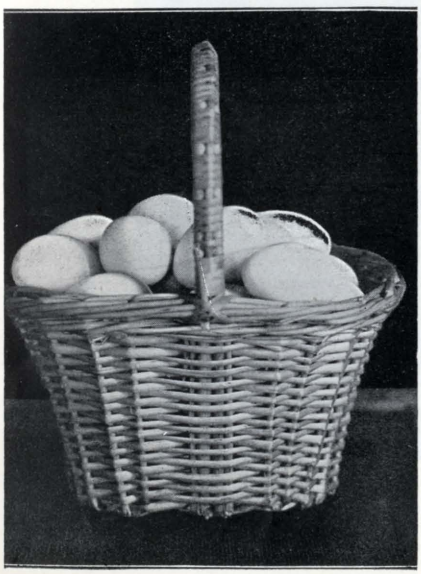
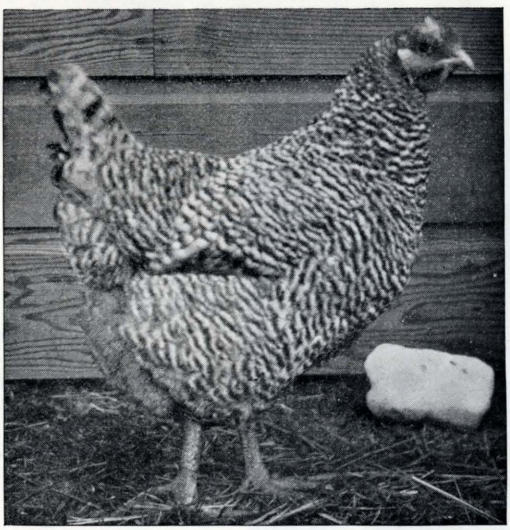


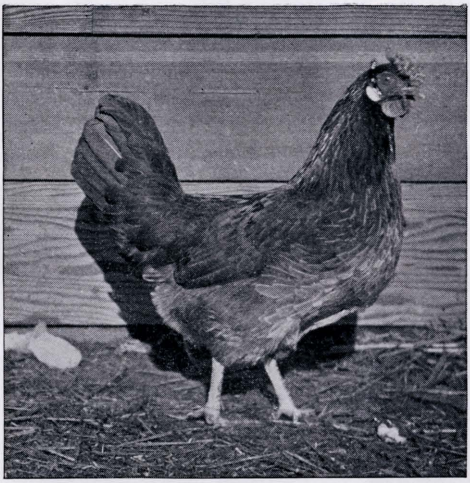
FIG. 3.

Fig. 1 represents the per cent profit from the pullets, and Fig. 2 from year-old hens, and Fig. 3 from old hens.

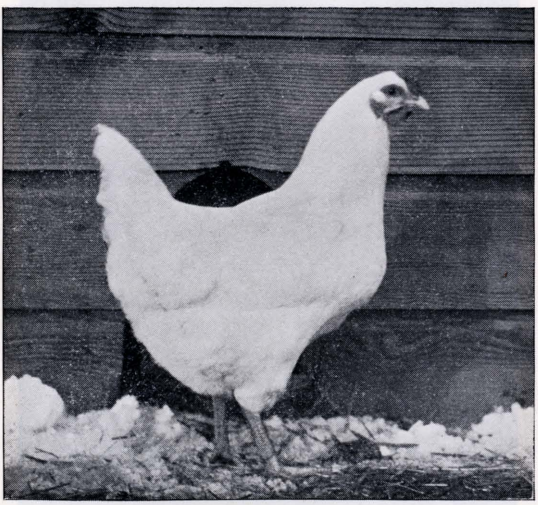
FIG. 2.



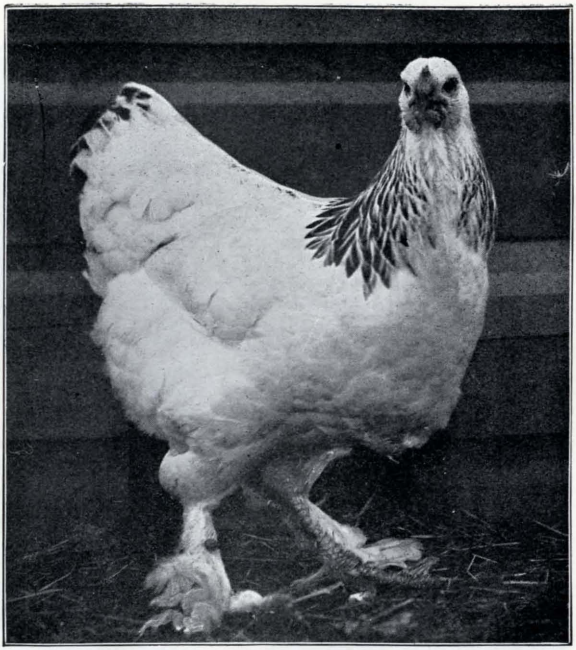
BARRED PLYMOUTH ROCK PULLET.



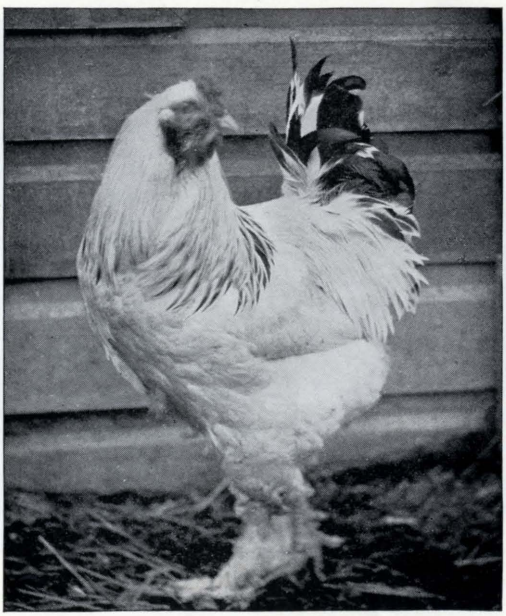
ROSE-COMB BRWON LEGHORN PULLET.



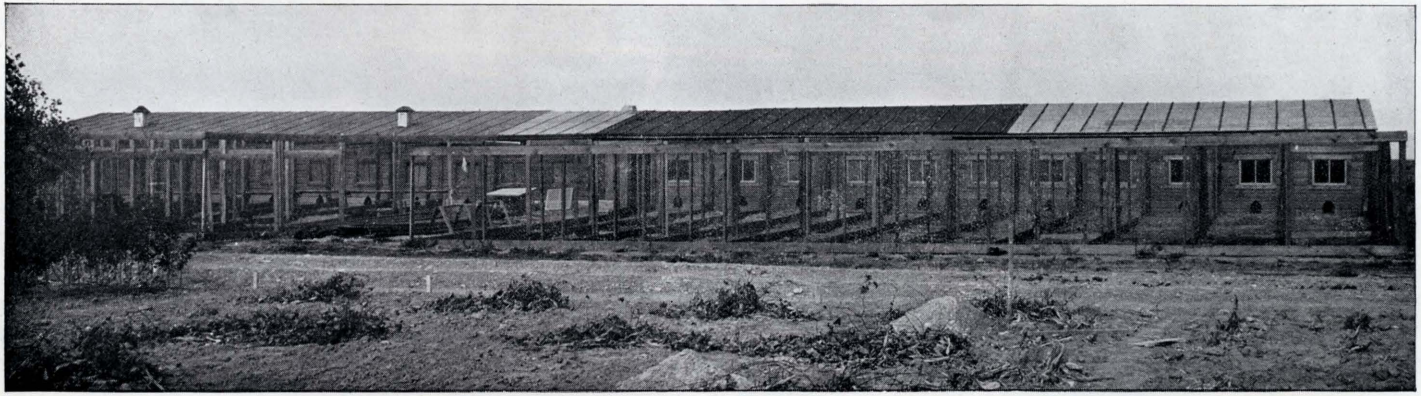
WHITE WYANDOTTE PULLET.



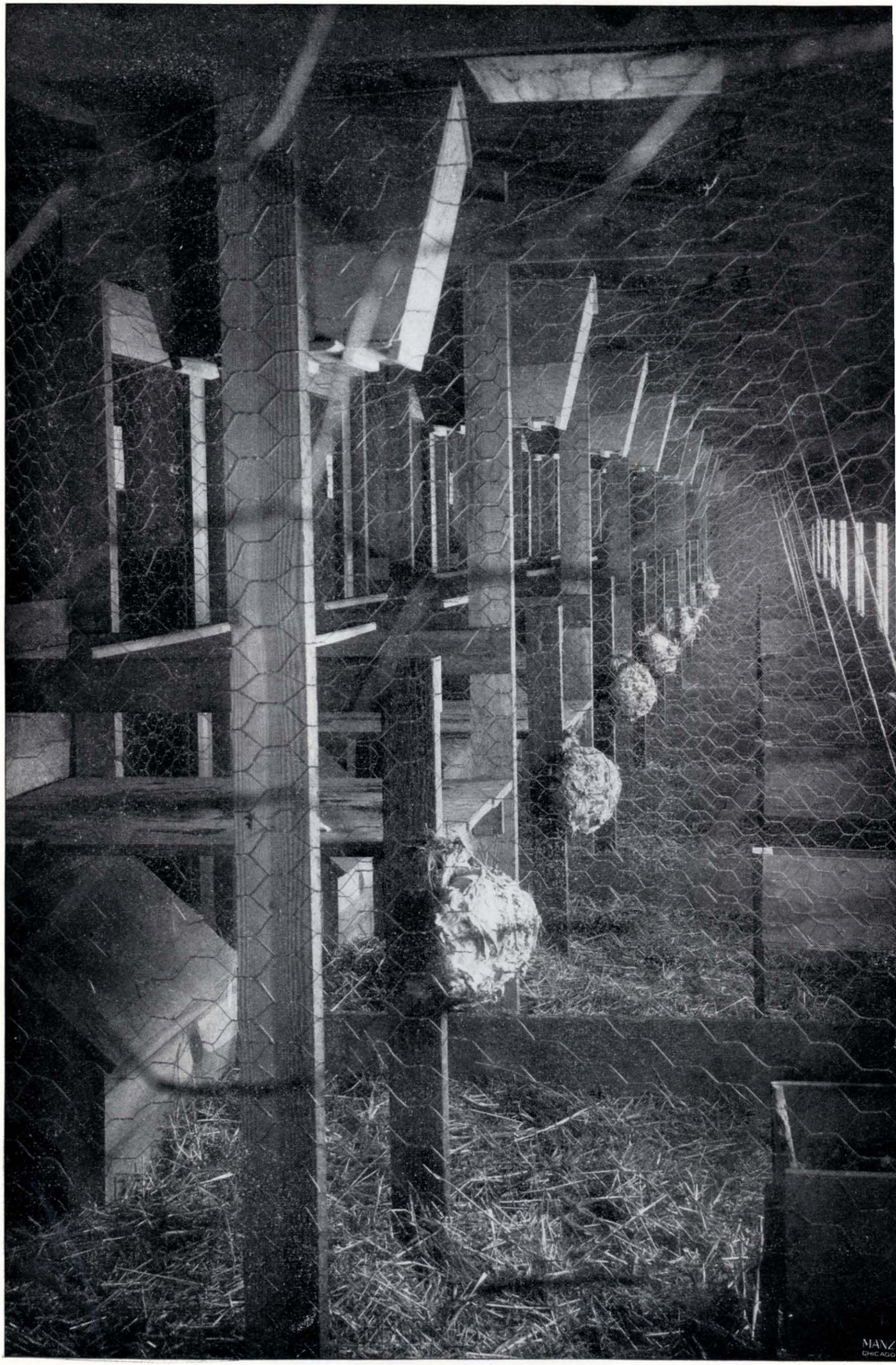
LIGHT BRAHMA PULLET.



LIGHT BRAHMA YEAR-OLD MALE.



EXTERIOR OF POULTRY HOUSE, DIVIDED INTO 24 PENS FOR EXPERIMENTAL PURPOSES.



INTERIOR VIEW OF POULTRY HOUSE.

TABLE No. X.—MINIMUM TEMPERATURE OF BUILDING.

	JAN.	FEB.	MAR.
1	26	29	44
2	26	33	38
3	27	32	40
4	28	34	40
5	29	32	39
6	34	31	38
7	38	39	44
8	32	41	46
9	36	30	37
10	36	27	38
11	32	32	33
12	25	39	37
13	20	39	36
14	25	40	34
15	25	41	36
16	30	44	33
17	32	29	37
18	32	27	39
19	34	36	33
20	34	34	38
21	32	....	40
22	32	....	25
23	31	32	26
24	21	33	31
25	18	42	41
26	16	41	37
27	19	40	34
28	21	42	38
29	29	....	34
30	31	....	37
31	27	....	40
Mean.....	25	35	37

OTHER EXPERIMENTS.

It has been thought best to defer a report until later, on the questions of the fertility of eggs, the merits of differ-

ent incubators and the effect of different methods in artificial incubation. These important problems are all in active process of incubation, and we hope to publish a bulletin on the results during the present year.

ADDITIONAL EXPERIMENTS.

During the past year an addition was made to our poultry building which doubles the capacity for experimentation. In the new building a series of feeding experiments are now in progress, and these will be reported at the end of the year

SUMMARY.

The following summarizes the results of the experiments as detailed in this bulletin. Some comparisons are made with the results reported in Bulletin No. 51:

1. During the year it cost an average of 64.3 cents per fowl for food for two pens of R. C. Brown Leghorn year-old hens. During their first year the cost was 61.7 cents per fowl.

2. As pullets they laid an average of 175 eggs per fowl during the year, worth $1.78; as year olds they averaged 132.5, worth $1.39½.

3. The average food cost per dozen of eggs was 4.3 cents during the first year and 6 cents the second year, or 40 per cent in favor of first year.

4. During the first year, as pullets, there was a profit of 188 per cent on cost of food, and 118 per cent profit as year-olds.

5. Further experiments are necessary to determine definately the relative value of fowls for egg production at different ages.

6. The best egg record during the second year was made by a pen of Brown Leghorn pullets, hatched June 10. They laid an average of 164.6 eggs per fowl, worth $1.78, at a food cost of 60.5 cents, equal to 4.4 cents per dozen. The per cent profit on food was 194. Two pens of April-hatched pullets averaged 159 eggs, making a profit of about 184 per cent on food cost. The pen of late hatched pullets was of a different strain from the others and was reared under different conditions and the results are not, therefore, to be accepted as proving anything as to the best time for hatching.

7. As to the effect of exercise, contradictory results were

secured. During the first year of pens 3 and 4 it required 22 per cent less food to produce a dozen of eggs with the exercise than without it. During the second year of the same pens the results are decidedly in favor of the pen without the exercise. The test with pullets during the second year gives inconclusive results on the same question.

8. Exercise had little apparent effect on the weight of the fowl, that little being a slight increase in weight.

9. The eggs from the two pens without exercise averaged 4 per cent heavier than those from the two exercised pens. This confirms results of the previous year.

10. The eggs from pens 3 and 4 weighed 3⅓ per cent more during their second year than during their first.

11. The exercised pens consumed a trifle more food than those without the exercise.

12. The eggs from the two pens of Light Brahmas weighed an average of 1.64 pounds per dozen; those from the five pens of Brown Leghorns averaged 1.46 per dozen; or about 12 per cent in favor of the former.

NOTE.—The conditions were not all favorable during the year for the highest egg production.

The Illustrations.—The illustrations in this bulletin are reproduced from photographs. Those of the fowls are given to show the kind of stock used in the experiments rather than as representatives of the breeds.